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Assessing the possible maintenance of TYLCV-satellite association

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Viruses of the genus *Begomovirus* (Family *Geminiviridae*) are frequently detected with half genome size DNA molecules, either defective DNAs or satellite DNA (α or β). Whereas some begomoviruses, like Tomato yellow leaf curl virus (TYLCV) were never detected with satellite DNAs, other begomoviruses, like Cotton leaf curl virus (CLCuV), depend upon a betasatellite for their infectivity. Besides the CLCuV-type begomoviruses which may be considered as bipartite begomoviruses, most of the begomoviruses detected with satellites were shown to be infective without their satellites. The alphasatellite was rarely proved to have any impact on the helper virus but the betasatellite was often shown to increase the virulence of its helper virus. Although satellites were never detected with TYLCV in natural conditions, TYLCV was reported as a helper virus for both satellites in artificial conditions and its virulence was dramatically increased when co-inoculated with betasatellites. We have confirmed these results with the Cotton leaf curl Gezira betasatellite (CLCuGB) and two alphasatellites, Cotton leaf curl Gezira alphasatellite (CLCuGA) and Okra leaf curl Burkina Faso alphasatellite (OLCA). If the co-infection of TYLCV and a betasatellite would occur in natural conditions, tomato production may be severely affected. As the probability of such a scenario mainly depends on the maintenance of TYLCV-satellite associations over time, we have studied various factors potentially determining this maintenance: (i) the relative intra-plant accumulation of TYLCV and the satellites, (ii) the cellular co-infection level of TYLCV and satellites, and (iv) the transmission efficiency of satellites by the vector *Bemisia tabaci*. These various factors were analyzed with CLCuGB, CLCuGA and OLCA.
Besides the specific question of the possible maintenance of satellites with TYLCV, the results of our study are expected to provide a new insight on begomoviruses detected in co-infection with satellites in natural conditions, but which were proved to be infectious without satellites.

Mots-clés : Alphasatellite, Betasatellite, Real time PCR, FISH, vector transmission.